

*Sub C2*

We claim:

1. A method for enhancing plant growth or yield, comprising exposing soil to  $H_2$  gas, and growing a plant in the soil.
2. The method of claim 1, further comprising combining the soil exposed to  $H_2$  with soil not exposed to  $H_2$ , and growing the plant in the thus combined soil.
3. The method of claim 2 wherein the amount of the combined soil which is the soil exposed to  $H_2$  is between about 5% and 100%, by volume.
4. The method of claim 1, wherein the soil exposed to  $H_2$  is combined with soil in which the plant is already growing.
5. The method of claim 1, wherein a seed or plant is planted in soil not exposed to  $H_2$  adjacent a volume of the soil exposed to  $H_2$ .
6. The method of claim 1, wherein the soil exposed to  $H_2$  is soil in which the plant is already growing.
7. The method of claim 1, wherein the  $H_2$  gas is generated by the electrolysis of water.
8. The method of claim 7, wherein the  $H_2$  gas is generated by providing an electrical current in the soil so as to generate  $H_2$  directly within the soil.
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9. The method of claim 1, wherein the  $H_2$  gas is generated by  $H_2$  evolving microorganisms.
10. The method of claim 9, wherein the  $H_2$  evolving microorganisms are also  $N_2$  fixing microorganisms.
11. The method of claim 1, wherein the  $H_2$  gas is provided by a legume selected for its

ability to produce H<sub>2</sub> gas.

12. The method of claim 11, wherein the legume has HUP- symbiotic nitrogen-fixing bacteria.

5 13. The method of claim 11, wherein the legume has inefficient nitrogen-fixing bacteria.

14. The method of claim 11, wherein the legume has distributed nodulation.

15. The method of claim 11, wherein the legume has an enhanced number of nodules.

16. The method of claim 1, further comprising placing the soil in a container that minimizes the diffusion of H<sub>2</sub> therefrom, and applying H<sub>2</sub> to the soil in the container.

10 17. The method of claim 1, further comprising covering the soil with a membrane having a low permeability to H<sub>2</sub>, and providing H<sub>2</sub> below the membrane, wherein at least a portion of the exposure of the soil to H<sub>2</sub> occurs beneath the membrane.

18. The method of claim 1, wherein the H<sub>2</sub> gas is provided to the soil via tubing or hollow probes placed in the soil.

15 Sub B1 19. A method for enhancing plant growth or yield, comprising:  
obtaining a soil sample; and  
exposing the soil sample to H<sub>2</sub> gas;  
wherein said exposure of soil to H<sub>2</sub> enhances the ability of soil microorganisms to oxidize H<sub>2</sub>; and

20 wherein said enhanced ability of the soil microorganisms potentiates enhanced growth or yield of a plant growing in said soil.

20. The method of claim 19, further comprising:  
isolating the microorganisms, and

applying the microorganisms to soil, seeds, or plant roots;  
wherein said application of microorganisms potentiates enhanced growth or yield  
of a plant.

21. The method of claim 20, further comprising culturing said microorganisms and applying the microorganisms to soil, seeds, or plant roots.

22. A method for enhancing plant growth or yield, comprising exposing soil to H<sub>2</sub> gas, obtaining an extract of the soil exposed to H<sub>2</sub> gas, and applying the extract to seeds, plant roots, or soil.

23. The method of claim 22, wherein the extract is an aqueous extract.

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